

In the Claims:

Claims 1 to 21 stand of record in the case.

Claims 1-12, 14, 15 and 81-21 stand rejected.

Claims 13, 16 and 17 are objected to.

Explanation of Amendments in the Claims:

1.(currently amended) A method of selective absorption of hydrogen sulfide relative to carbon dioxide from a supply gas stream comprising:

providing a supply gas stream containing at least a product gas, hydrogen sulfide and carbon dioxide;

providing an absorbent which absorbs both hydrogen sulfide and carbon dioxide while exhibiting preferential affinity for hydrogen sulfide relative to carbon dioxide;

generating a stream of the absorbent which moves from a lean condition in countercurrent flow over a series of contact stages to a stream of the supply gas so as to contact the absorbent with the supply gas stream so as to absorb at least partly the hydrogen sulfide and the carbon dioxide to form a rich absorbent while generating a stream of sweetened product gas which contains levels of hydrogen sulfide and carbon dioxide below a predetermined maximum allowable value;

passing the rich absorbent through a regeneration process which strips substantially all of the hydrogen sulfide and carbon dioxide from the rich absorbent returning the absorbent to the lean condition for said stream while generating a stream of the hydrogen sulfide and carbon dioxide;

providing a first absorber and a second absorber;

~~wherein the absorption of the hydrogen sulfide and carbon dioxide by the absorbent is carried out in two steps in which:~~

~~in a first operation the~~ first absorber supplying absorbent in lean condition and contacting the absorbent in lean condition ~~is contacted~~ with the supply gas stream

so that a stream of the sweetened product gas is extracted from the first absorber and a stream of the absorbent in rich condition is extracted from the first absorber;

supplying to an intermediate stage of the second absorber the stream of the absorbent in rich condition from the first absorber;

supplying to the second absorber a stream of the absorbent in lean condition;

from the second absorber extracting the absorbent in rich condition and supplying the extracted absorbent in rich condition as a single stream containing the absorbent in rich condition from the first and second absorbers to the regeneration process;

and in a second operation the second absorber the selectivity for hydrogen sulfide relative to carbon dioxide is enhanced by contacting the rich absorbent leaving the first operation absorber with a second gas which has a higher ratio of hydrogen sulfide relative to carbon dioxide than the supply gas stream so as to cause the already rich absorbent to become even more heavily loaded with hydrogen sulfide and carbon dioxide, but because of the high ratio of the second gas, the increased loading is preferentially in favor of hydrogen sulfide;

wherein the first absorber is arranged to control the amount of carbon dioxide in the sweetened product gas from the first tower by taking greater advantage of the natural preference of the absorbent for hydrogen sulfide to effect "slipping" of the carbon dioxide in the first absorber in which a portion of the carbon dioxide is permitted to exit with the sweetened product gas.

2.(currently amended) The method according to claim 1 wherein the

source of the second gas is the stream of the hydrogen sulfide and carbon dioxide, a portion of which is recycled back to the second operation absorber, where the stream of the hydrogen sulfide and carbon dioxide contains approximately the same ratio as existed in the rich absorbent after the second operation absorber. -

3.(currently amended) The method according to claim 1 wherein the contact with the second gas in the second operation absorber occurs counter currently over a series of contact stages.

4.(currently amended) The method according to claim 1 wherein the first and second operations absorbers ~~take place~~ are defined in the same countercurrent absorption column which operates throughout at substantially the same pressure.

5.(currently amended) The method according to claim 4 4 wherein ~~lean-amine absorbent in lean condition~~ entering at the a top of the an upper section of the column comes in contact with sour gas containing both H₂S and CO₂ which enters the column at an intermediate stage in the mid section of the absorber at the a point where the first operation absorber interfaces with the second operation, absorber, wherein the first operation-occurs absorber is located in the upper section of the column and the second operation-occurs absorber is located in the a lower section such that the combined actions of the first and second absorption-operations absorbers will attain an internal balance in which the ~~rich-amine-absorbent in rich condition~~ leaving the a base of the column ~~will be~~ is enriched in H₂S, while the CO₂ thus excluded from the ~~rich-amine solution absorbent in rich condition~~ will exit~~s~~ from the top of the column along with the sweetened product gas from which the H₂S has been removed.

6.(currently amended) The method according to claim 4 5 wherein there is provided a single feed of the lean absorbent in lean condition at a top of the first operation absorber.

7.(currently amended) The method according to claim 4 5 wherein there are provided a plurality of feeds of the lean absorbent in lean condition at different positions through the first and second operations absorbers.

8.(currently amended) The method according to claim 1 wherein the first and second operations absorbers ~~take place in at least two different~~ comprises a first absorber towers tower and the second absorber comprises a second absorber tower operating at a different pressures from the first absorber tower.

9.(cancelled)

10.(cancelled)

11.(cancelled)

12.(currently amended) The method according to claim ~~8~~ 1 including interposing a flash drum in the ~~feed~~ stream of ~~rich upstream~~ absorbent in rich condition from the first absorber where ~~the~~ a reduced pressure of the flash drum allows light dissolved vapors to evolve and be removed from the absorbent.

13.(currently amended) ~~The method according to claim 8~~ A method of selective absorption of hydrogen sulfide relative to carbon dioxide from a supply gas stream comprising:

providing a supply gas stream containing at least a product gas, hydrogen sulfide and carbon dioxide;

providing an absorbent which absorbs both hydrogen sulfide and carbon

dioxide while exhibiting preferential affinity for hydrogen sulfide relative to carbon dioxide;

generating a stream of the absorbent which moves from a lean condition in countercurrent flow over a series of contact stages to a stream of the supply gas so as to contact the absorbent with the supply gas stream so as to absorb at least partly the hydrogen sulfide and the carbon dioxide to form a rich absorbent while generating a stream of sweetened product gas which contains levels of hydrogen sulfide and carbon dioxide below a predetermined maximum allowable value;

passing the rich absorbent through a regeneration process which strips substantially all of the hydrogen sulfide and carbon dioxide from the rich absorbent returning the absorbent to the lean condition for said stream while generating a stream of the hydrogen sulfide and carbon dioxide;

providing a first absorber and a second absorber;

in the first absorber supplying absorbent in lean condition and contacting the absorbent in lean condition with the supply gas stream so that a stream of the sweetened product gas is extracted from the first absorber and a stream of the absorbent in rich condition is extracted from the first absorber;

supplying to an intermediate stage of the second absorber the stream of the absorbent in rich condition from the first absorber;

supplying to the second absorber a stream of the absorbent in lean condition;

from the second absorber extracting the absorbent in rich condition and supplying the extracted absorbent in rich condition to the regeneration process;

in the second absorber the selectivity for hydrogen sulfide relative to carbon dioxide is enhanced by contacting the rich absorbent leaving the first absorber with a second gas which has a higher ratio of hydrogen sulfide relative to carbon dioxide than the supply gas stream so as to cause the already rich absorbent to become even more heavily loaded with hydrogen sulfide and carbon dioxide, but because of the high ratio of the second gas, the increased loading is preferentially in favor of hydrogen sulfide;

wherein the first and second operations in the first and second towers absorbers are arranged such that the partially loaded absorbent from the upper stages of the second absorber combine combines with the rich the stream of the absorbent in rich condition from the first tower absorber and flow flows downward to the lower stages of the second tower absorber;

and wherein the first and second absorbers are arranged such that overall operation of the first and of the second towers absorbers reaches an internal balance in which the rich absorbent in rich condition leaving the bottom of the second tower absorber is enriched in hydrogen sulfide, while the carbon dioxide thus excluded from the absorbent exits from the top of the second tower absorber as a water saturated carbon dioxide stream essentially free of hydrogen sulfide.

14.(cancelled)

15.(cancelled)

16.(currently amended) ~~The method according to claim 8~~ A method of selective absorption of hydrogen sulfide relative to carbon dioxide from a supply gas stream comprising:

providing a supply gas stream containing at least a product gas, hydrogen sulfide and carbon dioxide;

providing an absorbent which absorbs both hydrogen sulfide and carbon dioxide while exhibiting preferential affinity for hydrogen sulfide relative to carbon dioxide;

generating a stream of the absorbent which moves from a lean condition in countercurrent flow over a series of contact stages to a stream of the supply gas so as to contact the absorbent with the supply gas stream so as to absorb at least partly the hydrogen sulfide and the carbon dioxide to form a rich absorbent while generating a stream of sweetened product gas which contains levels of hydrogen sulfide and carbon dioxide below a predetermined maximum allowable value;

passing the rich absorbent through a first regeneration process which strips substantially all of the hydrogen sulfide and carbon dioxide from the rich absorbent returning the absorbent to the lean condition for said stream while generating a stream of an acid gas product containing the hydrogen sulfide and carbon dioxide;

providing a first absorber and a second absorber;

in the first absorber supplying absorbent in lean condition and contacting the absorbent in lean condition with the supply gas stream so that a stream of the sweetened product gas is extracted from the first absorber and a stream of the absorbent in rich condition is extracted from the first absorber;

supplying to an intermediate stage of the second absorber a portion of the stream of the absorbent in rich condition from the first absorber;

supplying to the second absorber a stream of the absorbent in lean

condition:

from the second absorber extracting the absorbent in rich condition and supplying the extracted absorbent in rich condition as a single stream containing the absorbent in rich condition from the first and second absorbers to the regeneration process:

in the second absorber the selectivity for hydrogen sulfide relative to carbon dioxide is enhanced by contacting the rich absorbent leaving the first absorber with a second gas which has a higher ratio of hydrogen sulfide relative to carbon dioxide than the supply gas stream so as to cause the already rich absorbent to become even more heavily loaded with hydrogen sulfide and carbon dioxide, but because of the high ratio of the second gas, the increased loading is preferentially in favor of hydrogen sulfide:

providing a third absorber and a second regeneration process:

~~wherein there is provided a first and a second tower wherein the acid gas product from said regenerator~~ regeneration process and a portion of the rich amine absorbent in rich condition from the first absorber tower are sent to ~~[[a]] the third absorber;~~

~~tower and rich amine from the base of wherein absorbent in rich condition from the third absorber tower~~ is sent to ~~[[a]] the second regenerator~~ regeneration process which produces an overhead acid gas product in which the H₂S hydrogen sulfide is more concentrated than the acid gas product from the first ~~regenerator~~ regeneration process:

and wherein ~~aportion~~ a portion of the enriched acid gas product from the

second ~~regenerator~~ regeneration process is recycled to the ~~base of the~~ third absorber tower where it is contacted with a side stream of ~~rich-amine~~ the absorbent in rich condition from the first absorber tower, which enters at a mid section of the third absorber tower, and by ~~lean-amine~~ absorbent in lean condition that enters at a top of the third absorber tower, producing an overhead stream of ~~essentially pure CO₂~~ carbon dioxide and water vapor from the third absorber tower.

17.(cancelled)

18.(currently amended) The method according to claim 8 1 wherein the ~~lean-amine~~ absorbent in lean condition for the first absorber tower is drawn from a stage in the regeneration process above a reboiler while the ~~lean-amine~~ absorbent in lean condition for the second absorber tower is drawn from the bottom of the ~~regenerator~~ regeneration process in order to meet the differing tolerances of the first and second absorber towers absorbers for residual acid gas in the ~~lean-amine~~ absorbent in lean condition.

19.(currently amended) ~~The method according to claim 1~~ A method of selective absorption of hydrogen sulfide relative to carbon dioxide from a supply gas stream comprising:

providing a supply gas stream containing at least a product gas, hydrogen sulfide and carbon dioxide;

providing an absorbent which absorbs both hydrogen sulfide and carbon dioxide while exhibiting preferential affinity for hydrogen sulfide relative to carbon dioxide;

generating a stream of the absorbent which moves from a lean condition

in countercurrent flow over a series of contact stages to a stream of the supply gas so as to contact the absorbent with the supply gas stream so as to absorb at least partly the hydrogen sulfide and the carbon dioxide to form a rich absorbent while generating a stream of sweetened product gas which contains levels of hydrogen sulfide and carbon dioxide below a predetermined maximum allowable value:

passing the rich absorbent through a regeneration process which strips substantially all of the hydrogen sulfide and carbon dioxide from the rich absorbent returning the absorbent to the lean condition for said stream while generating a stream of the hydrogen sulfide and carbon dioxide:

providing a first absorber and a second absorber:

in the first absorber supplying absorbent in lean condition and contacting the absorbent in lean condition with the supply gas stream so that a stream of the sweetened product gas is extracted from the first absorber and a stream of the absorbent in rich condition is extracted from the first absorber:

supplying to an intermediate stage of the second absorber the stream of the absorbent in rich condition from the first absorber:

supplying to the second absorber a stream of the absorbent in lean condition:

from the second absorber extracting the absorbent in rich condition and supplying the extracted absorbent in rich condition to the regeneration process:

in the second absorber the selectivity for hydrogen sulfide relative to carbon dioxide is enhanced by contacting the rich absorbent leaving the first absorber with a second gas which has a higher ratio of hydrogen sulfide relative to carbon dioxide

than the supply gas stream so as to cause the already rich absorbent to become even more heavily loaded with hydrogen sulfide and carbon dioxide, but because of the high ratio of the second gas, the increased loading is preferentially in favor of hydrogen sulfide;

wherein, in order ~~it is desired~~ to maximize recovery of CO₂ as a by-product, ~~by minimizing slipping of CO₂ in a the first absorber tower~~ is minimized by adjusting operating conditions, including solution concentration, circulation rate, type of contacting device and/or stages of contact so as to increase CO₂ absorption in the first absorber tower thus enabling increased CO₂ production in the subsequent second absorber towers.

20.(currently amended) The method according to claim 1 in which side coolers are used on the absorbers to cool the process and to reduce the rate of the CO₂ reaction with amine the absorbent.

21.(cancelled)